Artusio, Jas. F.

# THE ANNUAL REPORT

*of the*

# DEPARTMENT *of* ANESTHESIOLOGY

# 1958

THE NEW YORK HOSPITAL-CORNELL MEDICAL CENTER

525 EAST 68TH STREET, NEW YORK 21, N. Y.

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*by* Joseph F. Artusio, Jr., M.D.

To the President of the Board of Governors of the Society of The New York Hospital:

It is a great privilege and honor to submit this first annual report of the new Department of Anesthesiology of The New York Hospital. Since the department as an independent entity is but 18 months old at this writing, it seems proper to deal primarily with its historical development.

Up until a few months ago, this department was a division of the Department of Surgery. However, in July of 1957 it was established as a major department in its own right. This was the culmination of the diligent work of many individuals. The gradual development and the final establishment of this department can be credited to Dr. Frank Glenn, whose understanding, constant support, and wise advice gave courage to those of us who were attempting to advance practice, teaching, and research in the relatively young field of anesthesiology.

This endeavor was begun but 10 years ago, and we have traveled only a short distance along the road of academic achievement. However, we hope that great strides will be made in the near future.

I know that your decision to establish this department will be a fruitful one, to the patient, to the young physician, and to the medical student. This department is a tribute to a group of men and women in anesthesiology with a crusading spirit, and to their colleagues in other disciplines whose confidence has done so much to make it a reality.

# ANESTHESIOLOGY

## INTRODUCTION

The anesthesia section of the Department of Surgery was reorganized in 1932 with the opening of the new hospital building. At that time Dr. Ella Hediger was in charge, assisted by Dr. Rose Andre and three nurse anesthetists. In 1935 Dr. Hediger resigned, and Miss Louise Merkel and subsequently Miss Sara Mullin supervised the anesthetics administered to surgical pavilion patients. Dr. Rose Andre continued to administer anesthetics to private patients.

Simultaneously a separate section of anesthesia functioned in the Department of Obstetrics and Gynecology under the charge of Miss Evelyn Roach. In 1937 the School for Nurse Anesthetists was established at The New York Hospital, and instruction was given by Miss Sara Mullin and subsequently by Miss Charlotte McCoy.

The anesthesia sections grew to a total of 24 nurse anesthetists in the main hospital and 8 nurse anesthetists in the Lying-In Hospital. The School for Nurse Anesthetists was closed in July, 1956.

Late in 1943, Dr. Ellen Foote was appointed Director of Anesthesia. She took over the supervision of the section of anesthesia of the Department of Surgery, The New York Hospital, and directed the nurse anesthetists in the choice of anesthetic agents and techniques. Following Dr. Foote's untimely death in 1945, Dr. Mary Ward took over as head of the section with the same responsibilities and duties.

In 1946 Dr. Joseph F. Artusio, Jr., having administered anesthesia in the armed forces for the three preceding years, became the first Resident in Surgery (Anesthesiology) at The New York Hospital under Dr. Mary Ward. Following his residency training, in 1947 he became an Assistant Attending Anesthesiologist, helping Dr. Ward with the duties of supervising nurse anesthetists, and administering anesthesia in the more difficult cases. On Dr. Ward's resignation in 1948, Dr. Artusio became the Anesthesiologist-in-Charge and began to train resident anesthesiologists. In the ensuing years, the number of such residents has grown, and as many as ten physicians have been in training at one time. Gradually the number of attending anesthesiologists has risen, so that Dr. Artusio is now assisted and supported by seven such physicians. This number of associates will gradually increase.

In 1955 Dr. Benjamin E. Marbury accepted as one of his major responsibilities, the supervision of the anesthesia section of the Department of Obstetrics and Gynecology. This was the first time that the anesthesia in this section was supervised by an anesthesiologist.

In July of 1957 the anesthesia sections of the Department of Surgery and of the Department of Obstetrics and Gynecology were combined into a newly created and independent Department of Anesthesiology, serving all of The New York Hospital, with Dr. Artusio appointed as Anesthesiologist-in-Chief. This department now administers, coordinates, and directs the clinical anesthesia services as well as the teaching and research in anesthesiology throughout the institution.

SENIOR STAFF

My associates in the administration of this department have been:

| | |
|---|---|
| Dr. Benjamin E. Marbury, Assoc. Attending Anesthesiologist | January, 1949 |
| Dr. Valentino D. B. Mazzia, Asst. Attending Anesthesiologist | July, 1952 |
| Dr. Marjorie J. Topkins, Asst. Attending Anesthesiologist . | July, 1952 |
| Dr. Anita H. Goulet, Asst. Attending Anesthesiologist . . | July, 1953 |
| Dr. Robert I. Schrier, Asst. Attending Anesthesiologist . . | October, 1956 |
| Dr. Andre Smessaert, Asst. Attending Anesthesiologist . . | April, 1957-June, 1958 |
| Dr. Herbert Erlanger, Asst. Attending Anesthesiologist . . | June, 1957 |
| Dr. Alan Van Poznak, Asst. Attending Anesthesiologist . . | February, 1958 |

The present senior staff numbers nine physicians, all but two of whom received their resident training at this institution.

Dr. Benjamin E. Marbury has been my close associate since he joined the attending staff in 1940. His assistance throughout the years has been invaluable in organizing the over-all clinical and teaching programs of our hospital and particularly in developing the section of this department that provides anesthesia for patients undergoing gynecological and obstetrical operations. He has had the constant support and encouragement of Dr. R. Gordon Douglas, the Obstetrician and Gynecologist-in-Chief. He is a member of the Infant Mortality Committee of the New York County Medical Society.

Dr. Valentino D. B. Mazzia has become a great asset to our department and now supervises the clinical anesthesia in the main hospital and directs the didactic residency training program. He represents this department on the institution's Formulary Committee and is a member of the Anesthesia Study Committee of New York State and County Medical Societies.

Dr. Marjorie J. Topkins directs our fine staff of nurse anesthetists and maintains excellent relations between them and the anesthesiologists. She represents this department on the Out-Patient Committee.

Dr. Anita H. Goulet is in charge of our fire and explosion prevention program and represents this department on the Procedure Committee.

Dr. Robert I. Schrier heads the statistical section of the department and is a member of the Record Committee of this institution. He also supervises the purchase and care of our extensive equipment.

Dr. Herbert Erlanger, a new member of our attending staff, has assumed his clinical duties and will gradually take his part in the administrative plan of this department.

Dr. Alan Van Poznak joined the staff this year and is in charge of developing the research laboratory of this department.

## RESIDENT STAFF

The complete list of resident staff appointments in anesthesiology for the year 1958 follows:

*First Year Resident*

| | |
|---|---|
| Dr. Manfred Alexander | July 1, 1957 - |
| *Dr. Gerald J. Millstein | October 7, 1957 - |
| Dr. Claire A. Schehr | July 1, 1957 - |
| Dr. Francis Tiers | August 1, 1957 - |
| Dr. Alan Van Poznak | Feb. 1, 1957 to Jan. 30, 1958 |

*Previous training before tour of duty with armed forces

*First Year Assistant Resident*

| | |
|---|---|
| Dr. Gunther Schlag | July 1, 1957 to June 30, 1958 |
| Dr. E. Ursula K. Miettinen | July 1, 1957 to June 30, 1958 |
| Dr. Mehdi Jandaghi | July 1, 1958 - |
| Dr. Richard E. Hunt | July 1, 1958 - |
| Dr. Esmeralda Mercado | July 1, 1958 - |
| Dr. George R. Monahan | July 1, 1958 - |

The positions available for resident training have increased from one in 1949 until they number twelve at the present time. It is interesting to note that of the residents who have completed their total resident training at this center, 67% have remained in academic medicine and are now performing clinical, teaching, and research duties in several institutions in our country.

We have made it a policy to accept a small number of foreign students who have been well recommended by their universities and who are going to return to their countries to advance anesthesia upon completion of training. We have sent trained physicians to Mexico, Greece, Finland, and Austria, and I am sure that these men will make a great impact on anesthesiology in their native lands.

## NURSE ANESTHETISTS

DR. MARJORIE J. TOPKINS in charge

Of 18 available positions for nurse anesthetists, 16 are presently filled. Three senior nurse anesthetists have administrative duties in association with their clinical duties. The nurse anesthetists serve a purely service function to this department and provide anesthesia to both pavilion and private patients. They are also instrumental in allowing us to pursue the residency training program as we know it today, in that they can furnish a type of clinical coverage which permits freedom for residency training and allows these physicians to pursue their didactic training in the basic sciences as applied to anesthesiology.

| | *Employment date* | *Resigned* |
|---|---|---|
| SARA MULLIN, Senior Nurse Anesthetist | Sept., 1932 | |
| JOSEPHINE CAHILL, Senior Nurse Anesthetist | Oct., 1943 | |
| ETHEL KOVAR, Senior Nurse Anesthetist | Oct., 1944 | |
| GRAYCE EVELETH, Staff Nurse Anesthetist | Nov., 1935 | |
| CATHERINE LITZEN, Staff Nurse Anesthetist | April, 1937 | |
| MARY SULLIVAN, Staff Nurse Anesthetist | May, 1948 | |
| ANNA TISCIONE, Staff Nurse Anesthetist | Aug., 1951 | Nov., 1958 |
| FRANCES ESTABROOK, Staff Nurse Anesthetist | June, 1955 | |
| IDA FERRANTI, Staff Nurse Anesthetist | Nov., 1955 | Feb., 1958 |
| ROSEMARY PRUITT, Staff Nurse Anesthetist | Jan., 1956 | |
| ANNE PREZIOSI, Staff Nurse Anesthetist | May, 1956 | Feb., 1958 |
| BARBARA SCHIPMAN, Staff Nurse Anesthetist | April, 1956 | May, 1958 |
| SHEILA MCDERMOTT, Staff Nurse Anesthetist | Dec., 1956 | |
| KAY OISHI, Staff Nurse Anesthetist | April, 1957 | June, 1958 |
| NORA FADOUL, Staff Nurse Anesthetist | June, 1957 | |
| JO BETTY DONALD, Staff Nurse Anesthetist | Aug., 1957 | |
| EVELYN KIRK, Staff Nurse Anesthetist | Sept., 1957 | Jan., 1958 |
| MARILYN SCIALO, Staff Nurse Anesthetist | Sept., 1957 | Jan., 1958 |
| HARRIET D. STEIN, Staff Nurse Anesthetist | Sept., 1957 | |
| ELIZABETH DAVIS, Staff Nurse Anesthetist | Feb., 1958 | |
| LORRAINE MANAYAN, Staff Nurse Anesthetist | Sept., 1958 | |
| LEONILDA FERNANDEZ, Staff Nurse Anesthetist | Sept., 1958 | |
| AUGUSTA DEGEORGE, Staff Nurse Anesthetist | Nov., 1958 | |
| CONSUELO HANSEN, Staff Nurse Anesthetist | Nov., 1958 | |
| MARY STEWART, Staff Nurse Anesthetist | Nov., 1958 | |

## FUNCTIONS OF THE DEPARTMENT OF ANESTHESIOLOGY

*Clinical Functions*

The clinical function of this department is to provide service primarily to the Department of Surgery and Department of Obstetrics and Gynecology; however, our services are available to and are utilized by all the departments in our institution.

The anesthesiologist sees the patient before surgery, and on the basis of the findings of the history and the physical and laboratory examinations, evaluates the physical status and the anesthetic risk and plans an anesthetic regimen. The anesthetic management and the operative procedure are discussed by the anesthesiologist and the surgeon, since they function as a surgical team in the care of the patient throughout his operative course. The anesthesiologist follows the patient during the period in the recovery room and also through the first week following the anesthesia. If complications occur, he follows the patient for a longer period until discharge.

The anesthesiologist acts as a consultant on problems involving pain. This consultation service is provided not only to surgery, but to all the other departments of the hospital. In those cases where such treatment seems appropriate, specific nerve blocks are accomplished to control both acute and chronic pain.

A fair portion of our service function is provided off the operating room floors. Anesthesia is administered in almost all the surgical clinics of our hospital, particularly Urology, Ophthalmology, and Dental Surgery.

Anesthetics are also provided to many of the diagnostic laboratories of our institution, particularly the laboratory for cardiac catheterization of the Department of Medicine, and for cardiac and cerebral angiography and lumbar aortography in the Department of Radiology.

Anesthesiology also provides service to the Department of Medicine, including help in respiratory problems, problems of drug overdose, and problems in inhalation therapy. Anesthesiology also functions in the Department of Psychiatry, primarily in giving anesthetics and associated muscle relaxants to patients undergoing electro-shock therapy to decrease the risk of fracture in this convulsive procedure.

In 1957 there was established a nerve block clinic, which was the first clinic of the Department in Anesthesiology in the Out Patient Department of this hospital. The patients are seen by an anesthesiologist who performs a diagnostic or therapeutic nerve block after appropriate investigation. This clinic saw its first patient on November 13, 1957, and in the last year, 34 nerve blocks including pudendal, intercostal, cervical plexus, and stellate blocks have been performed. Now supervised by Dr. Valentino D. B. Mazzia, we expect this new clinic to increase its patient load as it becomes known throughout our institution. At the present time it functions one half day a week, and all patients coming to it are referred from other clinics of the Out Patient Department.

## RESIDENT TEACHING FUNCTION

DR. VALENTINO D. B. MAZZIA in charge

A resident teaching program embraces two purposes: the teaching of an individual and the provision of service to society. For the individual physician, the program must develop adequate skill and knowledge of his specialty and must also lay the foundation for personal satisfaction in his work. From the social point of view, the individual must be of service to the hospital, the medical college, and society at large.

The residency program attempts to achieve these goals by combining various methods of instruction and clinical experience, but in particular it attempts to develop initiative and a sense of responsibility in the physician. The actual sequence of formal instruction in anesthesiology at the present time extends over a two-year period. However, in the near future, this program will be extended to three years.

Didactic material is correlated as closely as possible with clinical experience by limiting the latter at first and then progressively broadening it, until at the end of a year and a half of training, the resident should be able to manage most anesthesia problems.

During the first six weeks of residency training, didactic material consists of history of anesthesiology, orientation to the hospital, instruction in the use of the library, and basic principles of physiology, anatomy, and biochemistry as applied to anesthesia. In addition, there is also instruction in the pharmacology and the technique of administering diethyl ether. There is, however, no actual administration of anesthesia during this period. The resident does report with the other anesthesiologists at the same time in the morning and remains until the end of the working day. Each morning, he is assigned to a different anesthesiologist, and various fundamental topics in anesthesia are discussed "at the bedside." These topics include maintenance of a patent airway, methods of artificial ventilation, management of cardiac arrest, principles of fluid and electrolyte therapy, and blood replacement during surgery. The study room during this first six-week period is purposefully situated in the recovery unit of the hospital so that the resident can observe patients recovering from anesthesia and can assist in the care of whatever emergencies may arise.

During the second six weeks, the resident administers only open drop ether, progressing from surgery on the extremities through hernioplasty and pelvic surgery, and culminating in his last week in cholecystectomies and subtotal

gastrectomies. During this time he should develop a knowledge of the working pharmacology of diethyl ether, an ability to diagnose the depth of anesthesia, and some awareness of the type of the problems which may arise during the administration of an anesthetic and how to manage those problems. Supervision is provided at all times during this period. This insures that the resident obtains the maximum possible benefit from this experience. An implied principle underlying this second six-week period is that the anesthetic should be kept as simple as possible. The resident sees for himself that one drug, diethyl ether, administered in the simplest manner by dropping over a gauze-covered mask, can produce satisfactory anesthesia for a procedure as major as a subtotal gastrectomy. Throughout his residency, this principle of simplicity of technique and maximum utilization of each agent will be stressed. The airway during this time is maintained by holding the jaw or by using an oropharyngeal airway. Endotracheal techniques are not permitted unless the supervisor deems that one is necessary for a particular patient.

The didactic program consists of a detailed discussion of cardiovascular and respiratory physiology as related to anesthesia.

During the third month of training, the resident uses an anesthesia machine to administer nitrous oxide, oxygen, and ether, reproducing the sequence of operations he followed in the preceding six weeks. During this time the anesthesia machine and the mask are the only new factors added; thus residents learn just what the machine *per se* contributes to the management of the anesthesia.

The didactic teaching continues to stress the pharmacology of diethyl ether anesthesia and the surgical problems related to its administration, and also includes the pharmacology of nitrous oxide and ethylene and principles of blood therapy. At this juncture the administration of divinyl ether is begun. The fourth month is devoted to the administration of cyclopropane, again reproducing the sequence of operations that was followed with ether. Didactic sessions, as always, are held daily in the late afternoon and stress the pharmacology of the agents being administered during this time.

At the fifth month of training, the resident begins a period on second call for emergency surgical procedures. The senior resident is expected to call the junior resident and supervise or demonstrate the managment of emergency anesthesia. At the end of the first five months the resident begins to administer intravenous sodium thiopental with nitrous oxide—oxygen for analgesia.

In his sixth month he begins to accomplish orotracheal intubation, first during

deep ether anesthesia and then during cyclopropane. In the middle of the sixth month he becomes first call resident for emergencies, and the senior resident assumes the responsibility for second call. During this time the didactic sessions are devoted to the principles of orotracheal intubation and to a presentation of the pharmacology of the muscle relaxants in preparation for the administration of these agents.

The entire attending staff shares the teaching responsibilities, both didactic and clinical. In this way the resident is exposed to different points of view on the management of various anesthesia problems.

In the last three months of this period, literature review is held one day a week and case discussions and films are presented. The resident is also encouraged to attend evening anesthesia meetings in other institutions in the New York Metropolitan area.

In accordance with our originally stated goal, to develop a sense of responsibility and to obtain some satisfaction for the resident, our first year residents are not only taught, they also teach. In the experimental surgery laboratory, the third year medical students perform operations on fully anesthetized animals. The medical students rotate the assignment of anesthetizing, so that each one administers open drop ether three times. Our junior residents supervise the administration of these anesthesias and have an opportunity to teach the students some of the fundamental principles of levels of anesthesia and of the pharmacology of ether.

In the second six months of his residency, the clinical load becomes heavier because the resident has more technique available to him and can therefore solve more problems in anesthesia, and because the American Board of Anesthesiology recommends that 500 anesthetics a year be administered by a resident. Since our residents were doing only selected cases in the first few months it is necessary to increase the number of cases done in the last six months.

The presence of the Department of Obstetrics and Gynecology is of paramount importance in this over-all program. The gynecological cases are ideally suited for such a training program. The resident can accomplish these anesthesias first with open drop ether, then with ether with a machine, later with cyclopropane, and finally with pentothal nitrous oxide-oxygen. Most important of all in the Lying-In Hospital is the experience the resident acquires in administering anesthesia to obstetrical patients. From the social point of view, this experience may be most valuable, because competent anesthesia care is not

available to the overwhelming majority of women delivering in the United States today. As anesthesiologists, we acutely feel this responsibility of providing good anesthesia for mother and newborn. The anesthesia resident spends the day following an on-call night at the Lying-In Hospital doing only obstetrical anesthesia.

Administration of muscle relaxants is begun in the seventh month of residency. The resident first uses curare and flaxedil, and later in the month succinylcholine, at first by single injection and then later by continuous drip technique. The didactic material in this month consists of the patho-physiology of that state of cardiovascular collapse known as shock.

In the eighth month the resident administers trichlorethylene and rectal avertin. Needless to say, after the sixth month all the preceding techniques continue to be used, and new agents or techniques are merely superimposed on these already learned. Didactically the resident studies the autonomic nervous system, including anatomy, physiology, and pharmacology.

In the ninth month the resident begins to administer anesthesia for craniotomy, using induced hypotension and generalized hypothermia where applicable. As the occasion arises, he will also accomplish refrigeration anesthesia of a lower extremity for amputation. The didactic material consists of study of the drugs used for induced hypothermia and of crymotherapy. Toward the end of the month, the resident studies the principles of thoracic anesthesia, and in his tenth month he administers anesthesia for procedures in which there is a combined thoraco-abdominal incision and assists in the administration of anesthesia for cardiac surgery. In his eleventh month he administers anesthesia for intrathoracic procedures exclusive of cardiac surgery. The didactic material consists of a detailed study of local anesthetic agents. In the twelfth month he studies the application of these agents in regional anesthesia.

## SECOND YEAR

In the entire first year no attempt is made to teach or practice block or conduction anesthesia. Admittedly, this lack of experience with spinal anesthesia in the first year may seem disadvantageous to some. However, it is a fundamental principle in anesthesia administration that it is not primarily the agent or technique which determines the outcome, but rather the astuteness of the administrator. In other words there are practically no cases which must be done under block and spinal because they cannot be done under general anesthesia. The resident at the end of his first year knows this to be true from experience. It is in the second year that the resident learns to administer regional anesthesia. This sequence of general first and spinal second is important because it may

become necessary during a regional method for the anesthetist to convert to general anesthesia. Furthermore, the same safeguards of providing a sure airway as well as means of suction and of administration of positive pressure oxygen which are necessary before a general anesthesia is begun are also necessary before any regional technique is attempted. These apparently obvious, but frequently neglected principles of modern anesthesia are deeply impressed on the resident by the end of his first year.

Residents are scheduled to take a one-month vacation during their two years of training. Although the precise timing of this vacation is optional, they are encouraged to take it during the summer months of their second year. During this period, the new first year residents have no clinical duties but are undergoing a heavy program of indoctrination and teaching in which the new senior resident is expected to play an active part. There are no formal teaching sessions during the first two and a half months of the second year except insofar as the senior resident chooses to review his basic knowledge with the first year residents.

In the second year, the clinical training in general anesthesia stresses the management of the patient undergoing cardiac surgery with all techniques, including hypothermia, anesthesia during cardio-pulmonary bypass, the management of the very poor risk patient who often is subjected to extensive and lengthy procedures for removal of carcinomas or who may be suffering sepsis, and the management of anesthesia in the specialties of plastic surgery and neurosurgery where the airway can be a major postoperative problem.

By the end of his second year, every resident will have had an opportunity to administer anesthesia, under supervision, for every conceivable surgical problem approached today. On Wednesday afternoons the resident attends the nerve block clinic, where he has an opportunity to prescribe and perform nerve blocks.

The didactic part of the second year consists of three months devoted to the dissection of a cadaver with discussion of the anatomy involved in regional anesthesia and in the performance of nerve blocks. After the cadaver dissection, the didactic program is devoted to a month's study of fluid and electrolyte balance with particular reference to anesthesia and surgery, and a formal study of the causes and prevention of morbidity and mortality associated with anesthesia. From the end of his first year throughout his second year, the resident is expected to complete reports of deaths occurring within 24 hours after the induction of anesthesia for presentation to the Anesthesia Study Committee of the New York County Medical Society. In essence, these reports constitute

a continuing review of the morbidity and mortality in our institution. Of course, the resident writing the report prepares his own cases but is also expected to prepare and investigate those in which the anesthesia may have been administered by someone else. Before submission to the Committee, these reports are reviewed in detail with a member of the attending staff and thus serve as a very effective teaching tool. The meetings of the Committee are held once a month and the residents are expected to attend on a rotating basis with the representative from this department.

The techniques of pediatric and geriatric anesthesia are taught concurrently with those outlined above. Although both of these fields present special problems in management to the anesthetist, there is no need to isolate the resident from his other duties for this instruction.

In the course of his training, our resident is exposed to ideas and techniques of other institutions, not only by the evening lectures that he is expected to attend and by personal contact with the numerous prominent anesthesiologists who visit, but also by direct contact with residents from Memorial Hospital who are required to spend four months of their second year at The New York Hospital in order to round out their background to satisfy the requirements of the American Board of Anesthesiology.

In their second year, our residents assist in the teaching of the dental resident, who in his second year spends three months on anesthesia, and of medical students who are offered a one or two month elective in anesthesia in their fourth year. He assists in the weekly lecture demonstrations of anesthesia techniques presented to the fourth year student while they are on surgery. In the second year, that resident who has shown the greatest initiative, who has the best skill, and is the most conscientious is chosen as the chief resident, and he learns the skills of administration as he supervises the day-to-day clinical assignments of the other residents.

In the course of his second year, the resident is expected to accomplish his research project under supervision and to present it at a meeting of an anesthesia society. Most of our residents have succeeded in performing some research during their training. In some instances this research has proved to be a significant and lasting contribution to the science of medicine.

By instruction and example, we hope to achieve through this program the goal outlined at the beginning of this section, a level of competency in anesthesia second to none produced in any other training center. The resident acquires an ability to act as a true consultant in anesthesia, as a physician who

is part of the team managing the over-all patient. The personal satisfaction which comes from the knowledge that one is doing the best possible job that can be done and from the respect that one earns in the eyes of one's colleagues in other specialties is great with such a training program. Early in this program the resident performs services for the Medical College which redound to his own advantage. Naturally, service to the Pavilion patients of the hospital is taken for granted. He is encouraged to follow the example of the attending staff by serving on various committees and by attending their meetings.

In the long range, society as a whole must benefit from the improved anesthesia available from the well-trained anesthesiologist. The anesthesia mortality in this country today is appalling, being of the magnitude of between 1 to 1000 or 2000 operations. With some 10,000,000 operations a year being performed in the United States, the number of anesthesia deaths each year may be between 5,000 and 10,000. Many of these deaths are preventable, and one of the surest ways to prevent them is to train competent people to administer anesthesias.

## MEDICAL STUDENT TRAINING

Anesthesiology is taught to the Cornell University Medical College students in each of their four years of training. A one-hour lecture in applied anatomy is given in the first year upon the invitation of the Department of Anatomy.

During the second year, upon the invitation of the Department of Pharmacology, the Department of Anesthesiology participates in a joint four-hour lecture on the pharmacology of the anesthetic agents and in the pharmacology of the respiratory stimulants.

During the third year, while the student is assigned to the Department of Surgery, he receives seven one-hour lectures in the Department of Anesthesiology. These deal with the pharmacology of the anesthetic agents, the management of coma and the airway, operative risk, muscle relaxants, hypertensive agents, and hypothermic techniques. He also is instructed in local anesthetics, their uses and complications, and in cooperation with the armed forces, is given a lecture in anesthesia in the wounded man.

During the student's fourth year, while again in the Department of Surgery, he is given five one-hour noonday lectures of a practical nature. At each of these sessions a patient who is to undergo surgery, is anesthetized by one of a variety of suitable techniques. The indications, contraindications, and complications that can arise from these techniques are discussed. There is also a separate lecture on artificial ventilation and the uses of the various manual

methods of artificial ventilation, and a discussion-demonstration of the various types of mechanical artificial ventilators. Thus anesthesia is introduced to the medical student throughout his four years of training so that he develops some small appreciation and understanding of what the anesthesiologist does and what is the scope of his specialty.

## RESEARCH FUNCTION

### Dr. Alan Van Poznak in charge

The research activities of the department of anesthesiology during 1958 were divided into several categories. The first of these represents work done by Dr. Francis Tiers in further elucidation of the pharmacology of diethyl ether analgesia in anesthetized man. In this study, the nature of the dose-response relationship of d-tubocurarine was investigated, and it was found that diethyl ether, even in minimal analgesia quantities, sensitized the myoneural junction to the effects of d-tubocurarine, although not to the magnitude and duration seen in conventional surgical planes of anesthesia. In a separate study of either analgesia by Dr. Carl Ebersole, the levels of ether in arterial blood and in the inspired gas mixture were measured. The mean arterial blood concentration was 32 mg. per cent, and the mean concentration in the inspired mixture was 1.2 volume per cent. Although no gas sample could be made to ignite, the technique was not considered a truly non-explosive one.

The need for accurate instrumentation is increasing in both surgery and anesthesiology. Dr. Alan Van Poznak, assisted by Dr. Francis Tiers of this department, provided a continuing service in the development and operation of equipment used in conjunction with cardiac bypass surgery. At present, continuous intra-arterial blood, intracardiac and venous pressure are routinely monitored in addition to the EEG and EKG. Direct cuvette oximetry was recently added. It is expected that continuous pH and $CO_2$ analysis will be added in the near future.

Extension of the work with ether analgesia has resulted in the development of the concept of an anesthetic agent of intermediate potency. The need for better non-flammable anesthesia has long existed, and there is a wide range between the highly potent and the very weak non-flammable agents available today. Dr. Alan Van Poznak has attempted to develop an anesthetic agent with all the inocuous features of nitrous oxide, but of approximately twice the potency. It has been our aim to find an anesthetic agent whose ceiling biological effect is only that of light surgical anesthesia. In this search, now in its third year, we have screened many fluorinated hydrocarbons and ethers, and the

results in dogs have thus far been very encouraging.

Dr. Andre Smessaert and Dr. Claire Schehr initiated an over-all study on observations in the immediate postoperative period, with data collected from many patients. The first study to be published relates to the incidence of post-anesthetic nausea and vomiting, as related to age, sex, type and duration of surgery, anesthetic agents used, the presence of an endotracheal tube, and other factors. There are few carefully controlled statistical studies on this subject, and it is hoped that the facts obtained will provide much useful information.

On an entirely experimental basis, Dr. Van Poznak has started to study non-drug methods of producing anesthesia. Unconsciousness can be produced in many ways other than with drugs. We hope to produce satisfactory operative conditions by direct introduction of some sort of immediately reversible physical energy, rather than by drugs which must be excreted or detoxified.

## STATISTICS

Dr. Robert I. Schrier in charge

The statistical material of the Department of Anesthesiology, compiled in the preceding charts, is abstracted daily from anesthesia and clinic records by Miss Sara Mullin. Following abstraction, a code sheet, arranged according to IBM techniques serves as the specific guide for recording data on punch cards. This system affords considerable flexibility, so that as different topics of special interest arise, pertinent information can be readily amassed for study purposes.

At the present time, approximately 300 items are selected and recorded for routine departmental investigation. These are used in analysis for the resident training program, comparative studies on a calendar basis, special clinical research studies, as well as the annual summary.

Chart number I lists and totals the primary anesthetics used during the past year in the combined General Surgery, Gynecology, and Obstetrics Sections of the Department of Anesthesiology. The total of 4425 individual nitrous oxide anesthetics includes 2407 administrations on the Obstetrical service. This accounts for the seemingly high figure shown for this agent.

By far the largest group of anesthetics administered are of the inhalation, so-called general anesthetic variety. These accounted for approximately eighty per cent of the total number of anesthetics administered at The New York Hospital and emphasize the preferred choice of general inhalation anesthesia at this institution.

The smaller numbers of procedures (i.e. spinal, caudal, and regional block)

are mostly accounted for as part of the residency training program.

Avertin, at one time extremely popular for basal narcosis, has now been all but abandoned as a primary anesthetic because of its tendency to cause respiratory depression and hypotension.

Adjuvants for electro-shock therapy refers to the use of intravenous sodium pentothal and muscle relaxants in conjunction with positive pressure oxygen. This technique is utilized in specifically indicated patients, e.g. compression fractures of the vertebrae, osteoporosis, etc.

Chart number II reveals that approximately 31 per cent of the patients who received general anesthesia were also given neuromuscular blocking agents, and a like number had endotracheal catheters inserted for facilitation of pulmonary dynamics. If the obstetrics data is not included, then this approaches 37.5 per cent.

The tabulation of anesthetics by region, as in Chart III, is of special interest again for resident teaching, and even a cursory review indicates that an almost complete gross anatomical classification is employed.

In a small number of instances, the classification includes specific surgical procedures. However, for obvious reasons this is not feasible as a general method of tabulating. If, for example, we desired to study the hypophysectomies for which induced hypotension was employed, it would be necessary to sort the intracranial procedures where the technique was used. Since every case card has a history number inscribed on it, this then becomes a matter of eliminating all other intracranial procedures by reviewing the patient's charts.

1958

## Department of Anesthesiology

### General Surgery — GYN — Obstetrics

| | | |
|---|---|---|
| *Methods of induction to primary anesthesia* | | |
| I. V. Pentothal induction | | 7,466 |
| Vinethene induction | | 490 |
| Rectal Pentothal | | 173 |
| Avertin | | 75 |
| *Induction and maintenance with same anesthetic* | | |
| Cyclopropane induction to Cyclopropane maintenance | | 773 |
| Ether induction to Ether maintenance | | 431 |
| Nitrous Oxide induction to Nitrous Oxide maintenance | | 2,453 |
| *Technics* | | |
| Closed circle — $CO_2$ absorption technic | | 8,617 |
| Semi-closed circle — $CO_2$ absorption technic | | 5,140 |
| Open method mask | | 458 |
| Insufflation (Mouth hook, — Ayer's T tube) (Slocum tube) | | 861 |
| Non-rebreathing valves (for children) | | 49 |
| Infant closed circle — $CO_2$ absorption technic | | 38 |
| *Special technics* | | |
| Arfonad — controlled hypotension | | 179 |
| Cardiac pulmonary bypass | | 49 |
| Generalized hypothermia — tub | | 4 |
| Refrigeration — localized | | 2 |
| *Endotracheal intubation* | | |
| Nasoendotracheal | 135 | |
| Oroendotracheal | 4,553 | 4,688 |
| *Neuro-muscular blocking agents* | | |
| D'tubocurarine | 2,143 | |
| Succinylcholine | 1,893 | |
| Both combined | 817 | 4,853 |

CHART II Annual Summary — Methods of Induction Technics, Special Drugs.

1958

## Department of Anesthesiology

### General Surgery — GYN — Obstetrics

| | | | |
|---|---|---|---|
| Cyclopropane | | 7,232 | |
| Ether — closed circle | | 2,234 | |
| Ether — Open | | 1,212 | |
| Nitrous Oxide | | 4,425 | |
| I.V. Pentothal | | 153 | |
| Rectal Pentothal | | 30 | |
| Ethylene | | 4 | |
| Trilene (Trichlorethylene) | | 11 | |
| Vinethene | | 22 | |
| Avertin | | 1 | |
| Regional block for surgery | | 41 | |
| Spinal | | 184 | |
| Caudal | | 3 | |
| Refrigeration | | 2 | 15,554 |
| Locals O.R. | | 2,767 | |
| Blocks O.R. (Therapeutic & Diagnostic) | | 11 | |
| Locals — Clinics | | 452 | |
| Block Clinics | | 28 | |
| Adjuvants for electroshock therapy | | 137 | 3,395 |
| | | TOTAL | 18,949 |
| Private patients | 10,648 | | |
| Pavilion patients | 8,301 | 18,949 | |

CHART I—Annual Summary of Primary Anesthetics Administered.

1958

Department of Anesthesia

Includes General, Spinal and Block Anesthesias

| | |
|---|---|
| *Head and Neck* | |
| ENT (by region | 782 |
| Eye | 328 |
| Dental | 105 |
| Face | 94 |
| Thyroid | 229 |
| Head — superficial | 157 |
| Neck (arteriogram, etc.) | 305 |
| Intra-cranial | 269 |
| Esophagoscopy-Bronchoscopy | 36 |
| | 2,305 |
| *Thorax* | |
| Great Vessels | 20 |
| Mitral Valve | 80 |
| Cardiac-pulmonary bypass | 49 |
| Other cardiac surgery | 29 |
| Intra pleural | 142 |
| Extra pleural | 4 |
| Thorax, superficial | 402 |
| Thoracic cage | 24 |
| Shoulder | 39 |
| Thoracic sympathectomy | 7 |
| | 796 |
| *Upper Abdomen* | |
| Stomach and duodenum | 313 |
| Biliary tract | 586 |
| Retro-peritoneal | 21 |
| Colon | 266 |
| Pancreas | 26 |
| Spleen | 27 |
| Renal | 189 |
| Portal | 19 |
| | 1,447 |
| *Lower abdomen* | |
| Appendix | 236 |
| Bowel | 112 |
| O.B. Vag. delivery | 3,483 |
| GYN abdominal surgery | 683 |
| Urology-abdominal | 464 |
| Caesarean Section | 194 |
| Abdominal-perineal | 52 |
| Abdominal aorta and vessels | 56 |
| Ventral hernia | 14 |
| | 5,294 |
| *Abdominal wall* | |
| Hernia-Ing. fem. umb | 567 |
| Lumbar sympathectomy | 20 |
| Abdomen, superficial | 33 |
| Extra peritoneal | 2 |
| Burns, 10% body | 1 |
| | 623 |
| *Perineal* | |
| Perineal GU (TUR (Cysto) | 1,235 |
| Ano-rectal | 288 |
| Perineal GYN (D&C, etc.) | 2,244 |
| Vaginal hysterectomy | 166 |
| | 3,933 |
| *Spine* | |
| Column | 100 |
| Cord | 61 |
| Back, pilonidal, etc. | 97 |
| | 258 |
| *Limbs* | |
| Upper bone | 54 |
| Upper soft | 187 |
| Lower bone | 306 |
| Lower soft | 347 |
| | 894 |
| GRAND TOTAL | 15,550 |

CHART III—Anesthetics Administered for Surgery — by region

## CLOSING COMMENTS

This new department must now be advanced on all fronts — clinical, teaching, and research.

At a practical level consideration must be given to the space requirements of this new department. Increase in both office space and the establishment of adequate research laboratories is vital. The teachers and professors of this

department must have adequate space in which to think and work in order that they may produce new material. At the present time we are particularly interested in securing help to provide us with an adequate library and seminar room. This is most important for our residency training program. In spite of the great shortage of space, it is of paramount importance that we work toward this latter goal.

The next practical advance that must be made is in research funds,—funds to set up our research laboratories and funds to carry out research in them. These funds will be sought through governmental agencies and from private donors.

Although our aims seem high, I feel confident that I will receive the support which I have received in former years. I am confident in a short time our department in all spheres — clinical, teaching, and research — will justify its present place among the other major clinical departments of our institution.

JOSEPH F. ARTUSIO, JR., M.D., Anesthesiologist-in-Chief

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